

CLAIMS

1. A method of collecting vehicle operation data from a vehicle for later transmission to a remote monitoring recipient in a manner to minimize the bandwidth requirements for the
5 later transmission, comprising the steps of:

- providing a vehicle on-board computing device;
- providing a number of data acquisition modules, each to measure one or more operating characteristics of the vehicle, the operating characteristics corresponding to current values of a set of managed objects;
- interfacing the vehicle on-board computing device with each of the data acquisition modules;
- configuring the vehicle on-board computing device to:
 - a) form a diagnostic information base for receiving and storing values for each of the managed objects from each of the corresponding data acquisition modules;
 - b) assemble an event report based on information contained in the diagnostic information base; and
 - c) package the event report in a protocol data unit according to an SNMP-derived protocol.

2. A method as defined in claim 1 wherein the operating characteristics include GPS position, engine speed, road speed, or engine temperature, or an OBD-II parameter related to vehicle

emissions.

3. A method as defined in claim 2 wherein the OBD-II parameter includes misfire detection.
- 5 4. A method as defined in claim 1, further comprising the step of enabling the vehicle on-board computing device to:
 - a) establish a data link with the remote monitoring recipient; and
 - b) convey the protocol data unit over the data link.
- 10 5. A method as defined in claim 4, further comprising the step of enabling the remote monitoring recipient to issue a GET protocol data unit to retrieve the current values for a specific set of managed objects from the vehicle on-board computing device.
- 20 6. A method as defined in claim 5 further comprising the step of enabling the remote monitoring recipient to wait for an acknowledgement to the GET protocol data unit by the vehicle on-board computing device.
7. A method as defined in claim 4, further comprising the step enabling the vehicle on-board computing device to issue a TRAP protocol data unit to report a vehicular event.
8. A method as defined in claim 7 further comprising the step of enabling the vehicle on-board computing device to:
 - a) store threshold values or a reporting interval for each vehicular event; and
 - b) issue each TRAP protocol data unit, either when a threshold value has been exceeded or at a corresponding reporting interval.
- 30 9. A method as defined in claim 8 wherein the TRAP protocol data unit reports a GPS

position.

10. A method as defined in claim 4, further comprising the step of issuing an INFORM protocol data unit from the vehicle to report an exceptional vehicular event.

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11. A method as defined in claim 10, further comprising the step of enabling the vehicle on-board computing device to:

10 a) store any one of a plurality of specified exceptional vehicular events in the diagnostic information base, including one or more regulatory exceptions, maintenance exceptions or operational exceptions; and

15 b) issue the INFORM protocol data unit when any one of the specified events occurs.

- 20 12. A method as defined in claim 11 wherein the INFORM protocol data unit is sent as a result of a regulatory threshold level being exceeded.

- 25 13. A method as defined in claim 11 further comprising the step of enabling the vehicular onboard computing device to wait for a confirmation that a previous INFORM protocol data unit has been logged in a data base by the remote monitoring recipient.

- 30 14. A method as defined in claim 13, further comprising the step of re-transmitting the INFORM protocol data unit in the absence of a confirmation that a previous INFORM protocol data unit has been logged in a database by the remote monitoring recipient.

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15. A method as defined in claim 4, further comprising the step of enabling the remote monitoring recipient to issue a SET protocol data unit to the vehicle on-board computing device to set one or more of the managed objects.

- 30 16. A method as defined in claim 4, wherein the data link is wireless and includes an radio

frequency band under the IEEE 802.11 standard, a satellite RF packet network or a terrestrial RF packet network.

17. A method as defined in claim 4 wherein the protocol data unit is a REQUEST protocol
5 data unit, the protocol data unit excluding the ERROR STATUS and ERROR INDEX fields of the SNMP protocol.

18. A method as defined in claim 4 wherein the protocol data unit excludes the LENGTH field of each variable binding of the SNMP protocol.
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19. A method of conveying vehicle operation data from a vehicle to a remote monitoring recipient, comprising the steps of:
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- establishing a data link between the vehicle and the remote monitoring recipient;
- collecting vehicle operation data from data sources in the vehicle;
- packaging the vehicle operation data in a data packet using protocol derived from SNMP; and
- conveying the data packet over the data link, the protocol data unit being issued in response to a request by the remote monitoring recipient and containing both the request and requested values in the request and being encapsulated within a single message and in a single unfragmented network packet.
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25 20. A computer implemented system for conveying vehicle operation data from a vehicle to a remote monitoring recipient, comprising:

- an vehicle on-board computing device in communication with a number of vehicle operation data sources in the vehicle;
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- a wireless communications device for establishing a wireless data link with the vehicle on-board computing device and the remote monitoring recipient;
- 5 - the vehicle on-board computing device being enabled to package the vehicle operation data in a data packet using protocol derived from SNMP for transmission to the remote monitoring recipient over the wireless data link.